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and

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Education

Dec. 2003	Ph.D. in Natural Resources, University of Michigan, Ann Arbor, MI, US
Apr. 2001	Certificate in Industrial Ecology, School of Natural Resources and Environment, University of Michigan, Ann Arbor, MI, US
Aug. 2000	M. S. in Resource Policy and Behavior, School of Natural Resources and Environment, University of Michigan, Ann Arbor, MI, US
Feb. 1995	M. S. E. in Inorganic Materials Engineering, Graduate School of Engineering, Seoul National University, Seoul, Korea
Feb. 1993	B. S. E. in Inorganic Materials Engineering, College of Engineering, Seoul National University, Seoul, Korea

Research Experience

May 2008- present	Associate Research Scientist, Center for Life Cycle Analysis, Department of Earth & Environmental Engineering, Columbia University, New York
Nov. 2007-present	Member of Technical Committee for Task 12—Environmental, Safety and Health Issues of Photovoltaics, International Energy Agency (IEA)
Aug. 2006 – Apr. 2008	Research Collaborator, Center for Life Cycle Analysis, Earth & Environmental Engineering Department. Columbia University, New York.
Jan. 2005 –Apr 2008	Postdoctoral Research Associate, PV Environmental Research Center, Energy Sciences & Technology Department, Brookhaven National Laboratory. Upton, New York.
Jan. 2004 – Dec. 2004	Research Fellow, Center for Sustainable Systems, University of Michigan. Ann Arbor, MI.
Sep. 1998 – Dec. 2003	Research Assistant, Center for Sustainable Systems, University of Michigan
1995 - 1997	Research Engineer, Technical Center, Daewoo Motor Co., In-Cheon, Korea

Journal Publications

1. Kim, H.C. and V.M. Fthenakis. (2010) "Prospective Life Cycle Analysis of Nanotechnology: Multi-junction a-Si Photovoltaics", *Progress in Photovoltaics: Research and Applications*. In press.
2. Fthenakis, V. and H.C. Kim. (2010) "Life-cycle uses of water in U.S. electricity generation", *Renewable and Sustainable Energy Reviews*. In press.
<http://dx.doi.org/10.1016/j.rser.2010.03.008>
3. Fthenakis, V.M. and H.C. Kim. (2010) "Photovoltaics: Life Cycle Analysis", *Solar Energy*, In press. <http://dx.doi.org/10.1016/j.solener.2009.10.002>
4. Fthenakis, V. and H. C. Kim. (2009) "Land use and electricity generation: A life-cycle analysis", *Renewable and Sustainable Energy Reviews*, Vol. 13: pp. 1465-1474.
5. Fthenakis, V., W. Wang, and H.C. Kim. (2009) "Life Cycle Inventory Analysis of the Production of Metals used in Photovoltaics", *Renewable and Sustainable Energy Reviews*. Vol.13: pp. 493-517.
6. Fthenakis, V., H.C. Kim, and E. Alsema. (2008) "Emissions from Photovoltaic Life Cycles", *Environmental Science & Technology*. Vol.42 Issue 6: pp. 2168-2174.
7. Fthenakis, V.M. and H.C. Kim. (2007) "Greenhouse-gas emissions from solar electric- and nuclear power: A life-cycle study," *Energy Policy*. Vol. 35: pp. 2549-2557.
8. Fthenakis, V.M. and H.C. Kim. (2007) "CdTe Photovoltaics: Life Cycle Environmental Profile and Comparisons", *Thin Solid Films*, Vol. 515: pp. 5961-5963.
9. Kim, H. C., G. A. Keoleian, and Y. A. Horie. (2006) "Optimal Household Refrigerator Replacement Policy for Life Cycle Energy, Greenhouse Gas Emissions, and Cost", *Energy Policy*. Vol. 34 Issue 15: pp. 2310-2323.
10. Mason, J.E., V.M. Fthenakis, T. Hansen, and H.C. Kim (2006). "Energy Pay-Back and Life Cycle CO₂ Emissions of the BOS in an Optimized 3.5 MW PV Installation", *Progress in Photovoltaics: Research and Applications*. Vol. 14: pp.179-190.
11. Spitzley, D. V., D. E., Grande, G. A. Keoleian, and H.C. Kim. (2005) "Life Cycle Optimization of Emissions Reductions and Ownership Costs in US Vehicle Retirement Decisions", *Transportation Research Part D: Transport and Environment*, Vol.10: pp 161-175.
12. Kim, H. C., M. H. Ross, and G. A. Keoleian. (2004) "Optimal Fleet Conversion Policy from a Life Cycle Perspective", *Transportation Research Part D: Transport and Environment*, Vol.9 Issue 3: pp. 229-249.
13. Kim, H. C., G. A. Keoleian, D. E. Grande, and J. C. Bean. (2003) "Life Cycle Optimization of Automobile Replacement: Model and Application", *Environmental Science & Technology*, Vol.37 Issue 23: pp 5407-5413.

Other Publications

Alsema, E., D. Fraile, R. Frischknecht, V. Fthenakis, M. Held, H.C. Kim, W. Pölz, M. Raugei, and M. de Wild Scholten. (2009) “Methodology guidelines on life cycle assessment of photovoltaic electricity”, PVPS Task 12, Subtask 20, LCA. International Energy Agency.

Conference Papers

1. Fthenakis, V., H.C. Kim, M. Held, M. Raugei, and J. Krones. “Update of PV Energy Payback Times and Life-Cycle Greenhouse Gas Emissions”, 24th European Photovoltaic Solar Energy Conference, Hamburg, Germany, 21-25 September 2009.
2. Fthenakis, V., H.C. Kim, S. Gualtero and A. Broutsoulas. “Nanomaterials in PV Manufacture: Some Life Cycle Environmental and Health Considerations”, 34th IEEE Photovoltaic Specialist Conference. Philadelphia, PA. June 7-12, 2009.
3. Kim, H.C., K.G. Knight, N. Krishnan, and V.M. Fthenakis. “Life Cycle Analysis of Two New Concentrator Systems”, 23rd European Photovoltaic Solar Energy Conference, Valencia, Spain, 1-5 September 2008.
4. Kim, H.C. and V. Fthenakis. “The Fuel Cycles of Electricity Generation: A Comparison of Land Use”, Proceedings of 2007 Material Research Society Fall Meeting, Symposium R: Life Cycle Analysis of New Energy Generation and Storage Technologies, Boston, 26-28 Nov. 2007.
5. Fthenakis, V., S. Gualtero, R. van der Meulen and H.C. Kim. “Environmental Implications of Nanostructured Photovoltaics: A Comparative Life-cycle Analysis Framework”, Proceedings of Material Research Society, Symposium R: Life Cycle Analysis of New Energy Generation and Storage Technologies, Boston, 26-28 Nov. 2007.
6. Fthenakis, V.M. and H.C. Kim. “Cu(InGa)Se₂ thin-film solar cells: comparative life-cycle analysis of buffer layers”, 22nd European Photovoltaic Solar Energy Conference, Milan, Italy, 3-7 September 2007.
7. Fthenakis, V.M., H.C. Kim, A. Colli, A. Arellano, C. Kirchsteiger, and B. Ale. “Evaluation of Photovoltaics in a Comparative Context”, 21st European Photovoltaic Solar Energy Conference, Dresden, Germany, 4-8 September 2006.
8. Fthenakis, V.M. and H.C. Kim. “CdTe Photovoltaics: Life Cycle Environmental Profile and Comparisons”, European Material Research Society Meeting, Symposium O, Invited Paper. Nice, France. May 29-June 2, 2006.
9. Kim, H.C. and V.M. Fthenakis, “Amonix High-Concentrator Photovoltaic system: Life cycle energy demand and greenhouse gas emissions”, 2006 IEEE 4th World Conference on Photovoltaic Energy Conversion, May 7-12. Waikoloa, Hawaii.
10. Fthenakis, V.M. and H.C. Kim, “Quantifying The Life-Cycle Environmental Profile Of Photovoltaics And Comparisons With Other Electricity-Generating Technologies”, May 7-12. Waikoloa, Hawaii.

11. Fthenakis, V.M. and H.C. Kim, "Energy Use and Greenhouse Gas Emissions in the Life Cycle of CdTe Photovoltaics", Material Research Society Symposium Proceeding, 0895-G03-06.
12. Fthenakis, V.M. and H.C. Kim, "A Review of Risks in the Solar Electric Life-Cycle", JRC/TREN Conference on Safety & Security of Energy Infrastructures in a Comparative View (SEIF-CV), Brussels, Belgium. Nov. 14-16, 2005. European Commission, Directorate General Joint Research Center (JRC) / Energy and Transport (TREN).
13. Spitzley, D. V., D.E. Grande, H.C. Kim, and G. A. Keoleian. "Life Cycle Economics and Replacement Optimization for a Generic U.S. Family Sedan", SAE World Congress, SAE International, Technical Paper No. 2005-01-1553, Detroit, MI.
14. Kim, H. C., G. A. Keoleian, S. Spatari, and J. W. Bulkley. "Optimizing Vehicle Life Using Life Cycle Energy Analysis and Dynamic Replacement Modeling", Proceedings of the 2000 Total Life Cycle Conference, P-353, SAE International, Warrendale, PA, Paper No. 2000-01-1499: 241-25.

Invited Talks

1. Life Cycle Analysis of Photovoltaics: How Green is Solar Energy?". Invited Lecture at CAEE Graduate Seminars, February 12, 2010. Civil, Architectural & Environmental Engineering, Drexel University, Philadelphia, PA.
2. "Comparative LCA of Nanotechnologies in Thin-film PV Devices". Invited talk at the Nanotechnology & Life Cycle Analysis Workshop. Sponsored by NSF and EPA. 5-6 November 2009, Chicago, IL.
3. "The Fuel Cycles of Electricity Generation: A Comparison of Land Use". Invited talk at the Workshop on Land Use & Geospatial Aspects of LCA for Renewable Energy, Sponsored by National Science Foundation, 27-30 September, 2009, Boston MA.
4. "Energy Payback Time and Greenhouse Gas Emissions from the Photovoltaic Fuel Cycle". Invited Seminar at Korea Institute of Ceramic Engineering and Technology. Seoul, Korea. December 22, 2005.

Conference Presentations

1. Kim, H.C., "Life Cycle Analysis of Photovoltaics: an Update of Sustainability Indicators". Presented at 19th International Photovoltaic Science and Engineering Conference and Exhibition, November 9-13, 2009, Jeju, Korea.
2. Kim, H.C., K.G. Knight, N. Krishnan, and V.M. Fthenakis, "Life Cycle Analysis of Two New Concentrator Systems". Poster Presentation in 23rd European Photovoltaic Solar Energy Conference, Valencia, Spain, 1-5 September 2008.
3. Kim, H.C. and V. Fthenakis, "The Fuel Cycles of Electricity Generation: A Comparison of Land Use". Oral presentation at Material Research Society Fall Meeting, Symposium R: Life

Cycle Analysis of New Energy Generation and Storage Technologies, Boston, 26-28 Nov.2007

4. Fthenakis, V.M. and H.C. Kim, "Cu(InGa)Se₂ thin-film solar cells: comparative life-cycle analysis of buffer layers". Poster presentation at the 22nd European Photovoltaic Solar Energy Conference, Milan, Italy, 3-7 September 2007.
5. Kim, H. C. and V. Fthenakis, "Life Cycle Greenhouse Gas Emissions from the Nuclear and Photovoltaic Fuel Cycle." Oral presentation at Materials Research Society Fall Meeting. November 2005. Boston, MA.
6. Kim, H. C., G. A. Keoleian, and J. W. Bulkley, "Developing an Inspection and Maintenance Policy for High-Emitting Automobiles Using Reliability Analysis of Emission Control Systems". Poster presentation at Industrial Ecology for a Sustainable Future, International Society for Industrial Ecology Conference. June 2003, University of Michigan, Ann Arbor, MI.
7. Kim, H. C., "Vehicle Replacement Policy Using Life Cycle Optimization Modeling," Oral presentation at Environmental Sustainability Conference and Exhibition: Land, Sea & Air Mobility. 8-10 April 2002, Society of Automotive Engineers, Graz Convention Center, Graz, Austria.
8. Kim, H. C., G. A. Keoleian, and D. E. Grande, "Life Cycle Optimization of Vehicle Replacement", Poster presentation at U.S.-Korean Conference on Science, Technology, and Entrepreneurship. August 2001, MIT, Cambridge, MA.
9. Kim, H. C., G. A. Keoleian, S. Spatari, and J.W. Bulkley, "Optimizing Vehicle Life Using Life Cycle Energy Analysis and Dynamic Replacement Modeling," Oral presentation at 2000 Total Life Cycle Conference, Society of Automotive Engineers, Detroit, MI.

Mentorship Experience

1. Graduate Student Advisor, Athanasios Bourtsalas, M.S. expected Summer 2010, Earth and Environmental Engineering, Columbia University.
2. Graduate Student Advisor, Sandra Gualtero, M.S. Spring 2009, Earth and Environmental Engineering, Columbia University.
3. Graduate Student Advisor, Kevin Knight, M.S. Spring 2008, Earth and Environmental Engineering, Columbia University.
4. Graduate Student Advisor. Yuhta Horie, M.S. Summer 2004 in Resource Policy and Behavior, School of Natural Resources and Environment, University of Michigan.
5. Mentor for high school students, NASA SHARP/SAP program Pamela O'Leary--Remanufacturing of Vehicle Engine, 2001
6. Mentor for high school students, NASA SHARP/SAP program, Sharina Mapleton--Life Cycle Cost Analysis of a Generic Vehicle, 2000

Professional Activities

2009-present Reviewer of “Journal of Industrial Ecology”, Wiley InterScience.
2009-present Reviewer of “Renewable Energy,” Elsevier B.V.
2008-present Reviewer of “Energy Policy,” Elsevier B.V.
2009 Contributed to the online article, “Drink Up, Energy Hogs” By Jackie Grom
Science NOW Daily News 26 February 2009.
<http://sciencenow.sciencemag.org/cgi/content/full/2009/226/2>.

Professional Membership

2009-present American Chemical Society (ACS)
2007-present Technical Committee for PVPS Task 12, International Energy Agency (IEA)
2005-2007 Materials Research Society (MRS)
2000-2003 Society of Automotive Engineers (SAE)
2003 Completed 3 SAE professional development programs:
 - Automotive Fuel Cell Systems
 - Catalytic Converters: Design and Durability
 - Practical Reliability Engineering, Testing & Growth Management

Skills and Hobbies

- Proficiency in C, C++
- Golf
- Swimming
- Squash

Award

Apr. 2000 3M Prize for Outstanding Achievement in Industrial Ecology